DIVISION II – MATERIALS

SPECIAL PROVISION COPIED NOTES (SPCNs), SPECIAL PROVISION (SPs) and SUPPLEMENTAL SPECIFICATIONS (SSs)

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*These SPECIFICATIONS REVISIONS are subject to change on short notice.

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——STANDARD 200 SERIES SPCNs (SPECIAL PROVISION COPIED NOTES)——

*These SPECIFICATIONS REVISIONS are subject to change on short notice.

GUIDELINES — FOR PROJECTS REQUIRING CRUSHED GLASS TO BE A SEPARATE PAY ITEM. A SEPARATE PROJECT-SPECIFIC SPCN MUST BE INCLUDED THAT SPECIFIES FOR WHAT AND WHERE THE CRUSHED GLASS IS USED.

(**c200b00**-0708) **CRUSHED GLASS -** When not incorporated into the measurement and payment of other items by specification, crushed glass will be measured and paid for at the contract unit price per ton, which shall be full compensation for furnishing, placing, manipulating and compacting. Deliveries of crushed glass shall conform to Section 109.01(a) of the Specifications.

Payment will be made as follows:

Pay Item	**Pay Unit**
Crushed glass	Ton

1-17-08c (SPCN)

GUIDELINES – FOR ASPHALT MAINTENANCE PROJECTS WHEN CALLED FOR BY THE DISTRICT MATERIALS ENGINEER. USUALLY BRISTOL, SALEM OR STAUNTON DISTRICT PLANT MIX SCHEDULES.

(**c211hg0**-1209) **POLISHING AGGREGATE IN ASPHALT CONCRETE** - **Section 211—Asphalt Concrete** of the Specifications is amended as follows:

Section 211.02—Materials is amended by replacing (e) with the following:

Fine or coarse aggregate that tend to polish under traffic will not be permitted in any final surface exposed to traffic except as permitted within the limits of Section 211.04(a) and (b) of the Specifications and as designated by the Engineer or as permitted elsewhere in these Specifications.

Section 211.04—Asphalt Concrete Mixtures is amended by replacing (a) and (b) with the following:

Asphalt concrete mixtures shall conform to the requirements of Table II-14 and the following:

(a) **Types SM-9.0A, SM-9.0D, SM-9.0E, SM-9.5A, SM-9.5D and SM-9.5E asphalt concrete** shall consist of crushed stone, crushed slag, or crushed gravel and fine aggregate, slag or stone screenings or a combination thereof combined with asphalt cement.

NOTE: For all surface mixes, except where otherwise noted, no more than 5 percent of all aggregate retained on the No. 4 sieve and no more than 20 percent of the total aggregate may be polish susceptible. At the discretion of the Engineer, a SM-9.5AL may be specified and polish susceptible aggregates may be used (without percentage limits).

(b) **Types SM-12.5A, SM-12.5D, SM-12.5E, IM-19.0A, IM-19.0D, and IM-19.0E asphalt concrete** shall consist of crushed stone, crushed slag, or crushed gravel and fine aggregate, slag or stone screenings or a combination thereof combined with asphalt cement.

NOTE: At the discretion of the Engineer, an intermediate mix may be designated as either a SM-19.0A or SM-19.0D. For SM-12.5 and SM-19.0 surface mixes, no more than 5 percent of the aggregate retained on the No. 4 sieve may be polish susceptible. All material passing the No. 4 sieve may be polish susceptible. No more than 35 percent of the total aggregate composition (polish and non-polish susceptible) shall be passing the No. 8 sieve. At the discretion of the Engineer, a SM-12.5AL may be specified and polish susceptible aggregates may be used (without percentage limits).

10-7-09 (SPCN)

——SELECT USE 200 SERIES SPECIAL PROVISION COPIED NOTES (SPCNs)——

The following are Select Use Special Provision Copied Notes. None have been through the Department's complete Specifications Committee review/comment/acceptance process and are not part of the Standard Specifications. They are to be considered as project-specific and may be subject to modifications required to meet specific project conditions or requirements for Federal funding. Anyone making modifications is responsible for obtaining the appropriate expertise in the discipline applicable to the modification. If modifications are made the date must also be changed to reflect the current date. Please send a copy of the modified special provision copied note with the new date and specific project number to David.Gayle@VDOT.Virginia.gov so it may be added to the Specifications Stockpile.

cu211000a SM-22_5 Asph Conc (Bris Coal Co)

GUIDELINES – FOR ASPHALT MAINTENANCE PROJECTS IN BRISTOL DISTRICT COAL COUNTIES ONLY WHEN CALLED FOR BY THE DISTRICT MAINTENANCE ENGINEER.

SM-22.5 ASPHALT CONCRETE MIXTURES (Bristol District Coal Counties Only) — When asphalt concrete mix types SM-22.5 A, D, or E are specified in the Schedules, **TABLE II-13—Asphalt Concrete Mixtures: Design Range** of the Specifications shall be amended to add the following to the table:

TABLE II-13
Asphalt Concrete Mixtures: Design Range[1]

Mix Type	Percentage by Weight Passing Square Mesh Sieves										
	2 in	1 ½ in	1 in	¾ in	½ in	3/8 in	No. 4	No. 8	No. 30	No. 50	No. 200
SM-22.5 A,D,E			95-100	Max. 90	60-84			19-38			2-8

10-21-08a (SPCN)

cu221000a Weathering Steel Guardrail.doc

GUIDELINES – FOR PROJECTS REQUIRING WEATHERING STEEL GUARDRAIL.

WEATHERING STEEL GUARDRAIL — The rail element of guardrail and terminal ends shall be constructed of high-strength, low-alloy structural steel conforming to the requirements of AASHTO M180, Class A, Type 4, and shall be equivalent to ASTM A606 and erected in accordance with plan details. The rail element, posts, end terminals, fixed object attachments, and all associated hardware shall be furnished in an exposed unpainted condition and shall not be steel die stamped or marked with paint. The face of the rail shall be blast cleaned after installation to provide a uniform appearance. Bolts shall conform to the requirements of ASTM A325, Type 3. Nuts shall conform to the requirements of ASTM A563-C3, and washers shall conform to the requirements of ASTM F436, Type 3. All other associated steel hardware, including but not limited to offset blocks, terminal sections and fixed object attachments, shall conform to the requirements of ASTM A588. Payment shall be in accordance with Section 505 of the Specifications. All costs for hardware shall be included in the price bid for the related items of work, and no separate compensation will be made.

4-8-03a (SPCN)

——STANDARD 200 SERIES SPs (SPECIAL PROVISIONS)——

GUIDELINES — USE WHEN REQUESTED BY THE DESIGNER.

S208B00-0708

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
CRUSHED HYDRAULIC CEMENT CONCRETE (CHCC)
(USED AS SUBBASE AND AGGREGATE BASE MATERIAL)

January 14, 2008c

SECTION 208—SUBBASE AND AGGREGATE BASE MATERIAL of the Specifications is amended as follows:

Section 208.02—Materials is replaced with the following:

(a) **Subbase material** may consist of any mixture of natural or crushed gravel, crushed stone or slag, crushed hydraulic cement concrete (CHCC), natural or crushed sand; with or without soil mortar. Subbase material may be used in a stabilized or unstabilized form.

(b) **Aggregate base material** may be designated as Type I or Type II as follows: **Type I** shall consist of crushed stone, crushed slag, crushed hydraulic cement concrete (CHCC), crushed gravel or any combination of these material: with or without soil mortar or other admixtures. Crushed gravel shall consist of particles of which at least 90 percent by weight of the material retained on the No. 10 sieve shall have at least one face fractured by artificial crushing. **Type II** shall consist of gravel, stone, or slag screening; fine aggregate and crushed coarse aggregate; sand-clay-gravel mixtures; crushed hydraulic cement concrete; or any combination of these materials; with or without soil mortar or other admixtures. Aggregate base materials Type I or II may be used in a stabilized or unstabilized form.

(c) **Crushed Hydraulic Cement Concrete** shall not be used as Subbase or aggregate base material when any subsurface drainage system, such as standard underdrains (UD-4 or UD-5) and /or a stabilized open graded aggregate drainage layer (OGDL) is present, except when the CHCC is cement stabilized.

Section 208.03(b) Atterberg Limits is amended to add the following:

Plasticity: Subbase and aggregate base materials shall be either non-plastic (PI=0) or shall conform to the requirements of Table II-11 of the Specifications when tested in accordance with VTM-7. If the material is classified as non-plastic (PI=0), in accordance with VTM-7, the Liquid Limit requirement will be waived. Exceptions to this provision are noted as follows:

1. 100% CHCC and 20% or less CHCC Blends will be tested and subject to penalty as noted in Table II-11 of the Specifications for the plasticity index, excluding Liquid Limit penalties.

2. Greater than 20% CHCC Blends will follow testing guidelines as set forth in Section 208.06 (b) for Atterburg limits.

Section 208.03 is amended to add the following:

(h) **Deleterious Material:** The quantity of deleterious materials present in stockpiles of Crushed Hydraulic Cement Concrete, to be used in blending with virgin aggregates or as 100 percent CHCC, shall not exceed the following values:

MATERIAL	PERCENT BY WEIGHT *(MASS)*
Asphalt Concrete	5.0
Glass and Metals	5.0
Wood, Plastic, Brick and other foreign matter	0.5

Section 208.04—Job-Mix Formula is replaced by the following:

(a) The Contractor shall submit, or shall have the source of supply submit, for the Engineer's approval, a job-mix formula for each mixture to be supplied for the project prior to starting work. The formula shall be within the design range specified in Table II-9 of the Specifications. If unsatisfactory results or other conditions make it necessary, the Contractor shall prepare and submit a new job-mix formula for approval.

(b) A job mix formula shall be submitted for the engineer's approval for each category of CHCC mixture used. Designated categories shall indicate the mixture percentage of CHCC used according to the following criteria:

1. **Category 1**: 100% CHCC

   Category 2: 20% or less CHCC (20%)

   Category 3: greater than 20% CHCC but less than 100% CHCC (>20%<100%)

2. The quantity of CHCC in the mix shall be expressed as a percentage of the total mix.

Section 208.06—Acceptance is replaced with the following:

(a) The Contractor shall provide the quality assurance necessary for the Engineer to determine conformance to the required grading and Atterberg limits of subbase and aggregate base material.

Sampling and testing for determination of grading and Atterberg limits shall be performed by the Contractor. The Contractor shall provide copies of test results to the Department on forms furnished by the Department and shall maintain appropriate current quality control charts. The Department will perform independent monitor tests at a laboratory of its choice. If there is a statistically significant difference between the two sets of results, an investigation will be made to determine the reason for the difference. If it is determined that the material does not conform to the requirements of the Contract, the material will be rejected or a payment adjustment will be made in accordance with the requirements of Section 208.08 of the Specifications.

Determination of grading and Atterberg limits will be based on a mean of the results of tests performed on four samples taken in a stratified random manner from each 2,000-ton lot. Lots of 4,000 tons may be used when the normal daily production of the source from which the material being obtained is more than 2,000 tons. Unless otherwise approved, samples shall be obtained from the approximate center of truckloads of material. Any statistically acceptable method of randomization may be used to determine the time and location of the stratified random sample to be taken. The Department shall be advised of the method to be used prior to the beginning of production.

A lot will be considered acceptable for grading if the mean of the test results is within the deviation from the job-mix formula specified in Table II-10 of the Specifications.

A lot will be considered acceptable for Atterberg limits if the mean of the test results is less than the maximum for the liquid limit and plasticity index specified in Table II-11 of the Specifications.

If the liquid limit exceeds 30 or the plasticity index exceeds 6 for Type I base material or No. 19 subbase material; or the plasticity index exceeds 9 for Type II base material or subbase materials No. 20, 21, 21A, 21B, or 22 on any individual sample; that portion of the lot from which the sample was taken will be considered a separate part of the lot and shall be removed from the road.

If either the amount of material in the lot is less than 2,000 tons (4,000 tons if applicable), the job-mix formula is modified within a lot, or a portion of the lot is rejected on the basis of individual test results, the mean test results of the samples taken will be compared to the job-mix formula with the tolerances given in Tables II-10 and II-11 of the Specifications for the number of tests performed.

If a visual examination reveals that material in any load is obviously contaminated or segregated, the load will be rejected without additional sampling or testing of the lot. If it is necessary to determine grading or Atterberg limits of material in an individual load, one sample (taken from the load) will be tested and the results compared to the job-mix formula with the tolerances given in Tables II-10 and II-11 of the Specifications for one test. Results obtained in the testing of a specific individual load will apply only to the load in question.

(b) The following applies specifically to the use of Crushed Hydraulic Cement Concrete (CHCC) mixtures. All provisions for acceptance of these products shall conform to the same criteria as in (a) herein with the following additions:

1. **100% CHCC** shall conform to the requirements of this special provision.

2. **20% or Less CHCC Blends** shall conform to the requirements of this special provision.

3. **Greater than 20% CHCC Blends** shall conform to the following:

    a. The virgin aggregate portion of the blend will be tested for Atterberg limits, prior to CHCC blending.

    b. Price adjustments for Liquid Limit and the Plasticity Index of the virgin aggregates used in the blend with CHCC shall be in accordance with Table II-11 of the Specifications.

    c. No additional testing for Liquid Limit or Plasticity Index will be required on the final blended product.

4. All shipments of products containing CHCC must be designated on the shipping ticket (scale ticket) by the use of the letter "R". Examples: [22R, 21AR and 21BR] for: Aggregate Base material, Type I or Subbase materials.

GUIDELINES — USE WHEN REQUESTED BY THE DISTRICT MATERIALS ENGINEER. WHEN THIS PROVISION APPLIES INCLUDE THE FOLLOWING IN THE PROPOSAL: SS21103 SuperPave -Asphalt Concrete and SS31504 SuperPave -Asphalt Conc Pave.

S211JG0-0609

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
RECLAIMED ASPHALT SHINGLES (RAS) (TEAR OFFS) IN HOT MIX ASPHALT CONCRETE

June 24, 2008

I. DESCRIPTION

This specification covers reclaimed asphalt shingles (RAS) tear-offs used in hot mix asphalt (HMA) concrete. These requirements are to be met in addition to those contained in Section 211 of the Specifications. The Contractor shall receive approval by the Engineer to use RAS tear-offs in the HMA concrete.

II. MATERIALS

(a) **Tear-off RAS materials** shall be discarded shingle scrap from the re-roofing of domestic buildings. These tear-offs shall have been produced by the manufacturing process for roofing shingles. Blending or mixing of Tear-offs with Tabs shall not be permitted.

Tear-off RAS materials shall be free from foreign materials such as paper, roofing nails, wood, or metal flashing. Materials shall be shredded prior to being incorporated in the HMA mixture so that one hundred percent of the shredded pieces are less than 1/2 inches (12. 5 mm) in any dimension.

Tear-off RAS materials shall not contain asbestos fibers. If tear-off shingles are to be used, the Contactor shall furnish test results of RAS sample analysis for Polarized Light Microscopy (PLM) on the tear-off shingles which certify the material to be used is free of asbestos. Testing is required at the specified rate of 1 per 100 tons of RAS prior to processing and results shall be submitted prior to or during the stockpile approval process.

(b) **Asphalt Binder shall be** Performance Grade (PG) of asphalt conforming to the requirements specified in Section 211 and Table II-14A, Asphalt Concrete Mixtures (Superpave.) The selection of the PG of asphalt from Table II-14A shall be governed by the combined amount of RAS and RAP.

(For estimation purposes only, it may be assumed that 1 percent RAS is equivalent to 4 percent RAP.)

III. DETAIL REQUIREMENTS

RAS tear-offs in hot mix asphalt concrete shall be mixed mechanically in a plant specifically designed for producing hot mix asphalt for HMA production.

IV. JOB-MIX FORMULA

The Contractor shall submit a job mix formula in accordance to section 211.03 of the Specifications. The Contractor shall submit material samples to include the RAS stockpiled tear-off shingles, reclaimed asphalt pavement (RAP) and PG Binder.

The amount of RAS material used in the recycled mixture shall be no more than five percent of the total mixture weight. The combined percentages of RAS and RAP shall not contribute more than twenty- five percent of the total asphalt content of the mixture, according to the following equation:

$$\frac{\left(\%RAS_{mix} \times \%AC_{RAS}/100\right) + \left(\%RAP_{mix} \times \%AC_{RAP}/100\right)}{\%AC_{JMF}} \leq 25.0\%$$

Where:

% RAS_{mix} =	Percent RAS in the Job Mix Formula
% AC_{RAS} =	Average Percent AC in the RAS
% RAP_{mix} =	Percent RAP in the Job Mix Formula
% AC_{RAP} =	Average Percent AC in the RAP
% AC_{JMF} =	Design AC content of the JMF

The Contractor shall determine the asphalt content of the RAS using AASHTO T-164, Method B, or AASHTO T-308 and report the average results to the nearest 0.1 percent.

V. STORING MATERIALS

Contractors shall store tear-off RAS by stockpiling either whole or as partial shingles which have not been shredded or shredded shingles that meet the maximum size requirements. Stockpiled RAS shall not be contaminated by dirt or other objectionable foreign materials. Blending of the shingles with fine aggregate may be necessary to prevent conglomeration of shingle particles. When fine aggregate is used for this purpose, this material shall be accounted for in the mix design. Tabs shall be stockpiled separately.

GUIDELINES — USE WHEN REQUESTED BY THE DISTRICT MATERIALS ENGINEER. WHEN THIS PROVISION APPLIES INCLUDE THE FOLLOWING IN THE PROPOSAL: SS21103 SuperPave -Asphalt Concrete and SS31504 SuperPave -Asphalt Conc Pave.

S211KG0-0609

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
RECLAIMED ASPHALT SHINGLES (RAS) TABS IN HOT MIX ASPHALT CONCRETE

June 23, 2008

I. DESCRIPTION

This specification covers reclaimed asphalt shingles (RAS) tabs used in hot mix asphalt (HMA) concrete. These requirements are to be met in addition to those contained in Section 211 of the Specifications. The Contractor shall receive approval by the Engineer to use RAS tabs in the HMA concrete.

II. MATERIALS

(a) **Tabs RAS materials** shall be produced by the manufacturing process for domestic roofing shingles. Blending or mixing of Tabs and Tear-offs shall not be permitted.

Tabs RAS materials shall be shredded prior to being incorporated in the HMA mixture so that one hundred percent of the shredded pieces are less than 1/2 inches (12.5mm) in any dimension.

Tabs RAS materials shall not contain asbestos fibers. The Contactor shall furnish the Department a certification from the manufacturer of the shingles stating that the shingles are free of asbestos. If a certification can not be obtained then the contractor shall furnish test results of RAS sample analysis for Polarized Light Microscopy (PLM) on the shingles which certify the material to be used is free of asbestos. Testing is required at the specified rate of 1 per manufacturer per type of RAS prior to processing and results shall be submitted prior to or during the stockpile approval process.

(b) **Asphalt Binder shall be** Performance Grade (PG) of asphalt conforming to the requirements specified in Section 211 and Table II-14A of the Specifications, Asphalt Concrete Mixtures (Superpave). The selection of the PG of asphalt from Table II-14A of the Specifications shall be governed by the combined amount of RAS and reclaimed asphalt pavement (RAP).

(For estimation purposes only, it may be assumed that 1 percent RAS is equivalent to 4 percent RAP.)

III. DETAIL REQUIREMENTS

RAS tabs in hot mix asphalt concrete shall be mixed mechanically in a plant specifically designed for producing hot mix asphalt for HMA production.

IV. JOB-MIX FORMULA

The Contractor shall submit a job mix formula in accordance to section 211.03 of the Specifications. The Contractor shall submit material samples to include the RAS stockpiled shingles, reclaimed asphalt pavement (RAP) and PG Binder.

The amount of RAS material used in the recycled mixture shall be no more than five percent of the total mixture weight. The combined percentages of RAS and RAP shall not contribute more than twenty-five percent of the total asphalt content (AC) of the mixture, according to the following equation:

$$\frac{\left(\%RAS_{mix} \times \%AC_{RAS}/100\right) + \left(\%RAP_{mix} \times \%AC_{RAP}/100\right)}{\%AC_{JMF}} \leq 25.0\%$$

Where:

% RAS_{mix} =	Percent RAS in the Job Mix Formula
% AC_{RAS} =	Average Percent AC in the RAS
% RAP_{mix} =	Percent RAP in the Job Mix Formula
% AC_{RAP} =	Average Percent AC in the RAP
% AC_{JMF} =	Design AC content of the JMF

The Contractor shall determine the asphalt content of the RAS using AASHTO T-164, Method B, or AASHTO T-308 and report the average results to the nearest 0.1 percent.

V. STORING MATERIALS

Contractors shall store tabs RAS by stockpiling either whole or as partial shingles which have not been shredded or shredded shingles that meet the maximum size requirements. Stockpiled RAS shall not be contaminated by dirt or other objectionable materials. Blending of the shingles with fine aggregate may be necessary to prevent conglomeration of shingle particles. When fine aggregate is used for this purpose, this material shall be accounted for in the mix design. Tabs shall be stockpiled separately.

GUIDELINES — INCLUDE WHEN CORROSION RESISTANT REINFORCING STEEL IS DESIGNATED ON THE PLANS.

S223AG0-0210

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
CORROSION RESISTANT REINFORCING STEEL

November 19, 2009

SECTION 223—STEEL REINFORCEMENT of the Specifications is revised as follows:

Section 223.02 Materials is amended to add the following:

(e) **Low-carbon, Chromium, reinforcing steel: Steel** shall conform to the requirements of ASTM A1035/A1035M – Standard Specification for Deformed and Plain, Low-carbon, Chromium, Steel Bars for Concrete Reinforcement.

(f) **Solid Stainless reinforcing steel: Steel** shall conform to the requirements of ASTM A955/A955M - Standard and Specification for Deformed and Plain Solid Stainless Steel Bars for Concrete Reinforcement. UNS* Designations: S24000, S24100, S30400, S31603, S31653, S31803, S32101,

(g) **Steel Clad reinforcing steel: Steel** shall conform to the requirements of AASHTO Designation: MP 13M/MP 13-04, Standard Specification for Stainless Steel Clad Deformed and Plain Round Steel Bars for Concrete Reinforcement.

* Unified Numbering System for Metals and Alloys

SECTION 406—REINFORCING STEEL is amended as follows:

Section 406.02 Materials is amended to add the following:

(e) **Corrosion resistant steel used for reinforcement** shall conform to the requirements of Section 223.

Section 406.04 Measurement and Payment of the Specifications is amended add the following:

Corrosion resistant reinforcing steel, when a pay item**,** will be measured in pounds and paid for at the contract unit price per pound of the designated type of steel indicated and placed in the structure in the location(s) shown on the plans. This price shall include fabricating, shipping, furnishing and placement.

Payment will be made under:

Pay Item	Pay Unit
Corrosion resistant reinforcing steel, low carbon\chromium	Pound
Corrosion resistant reinforcing steel, Stainless clad	Pound
Corrosion resistant reinforcing steel, Solid stainless	Pound

——SELECT USE 200 SERIES SPs (SPECIAL PROVISIONS)——

The following are Select Use Special Provisions. None have been through the Department's complete Specifications Committee review/comment/acceptance process and are not part of the Standard Specifications. They are to be considered as project-specific and may be subject to modifications required to meet specific project conditions or requirements for Federal funding. Anyone making modifications is responsible for obtaining the appropriate expertise in the discipline applicable to the modification. If modifications are made the date must also be changed to reflect the current date. Please send a copy of the modified special provision with the new date and specific project number to David.Gayle@VDOT.Virginia.gov so it may be added to the Specifications Stockpile.

SU210000A Thin Hot Mix Asph Conc Overlay

GUIDELINES – FOR PROJECTS WHERE "THIN HOT MIX ASPHALT CONCRETE OVERLAY" IS REQUIRED.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
THIN HOT MIX ASPHALT CONCRETE OVERLAY

June 1, 2007a

I. DESCRIPTION

This work shall consist of the production and placement of a thin hot mix asphalt concrete overlay in accordance with the contract requirements, this provision, and as directed by the Engineer.

II. MATERIALS

A. **Asphalt:** The asphalt cement shall be a performance graded asphalt (PG) 70-28 conforming to the requirements of AASHTO Provisional Specification MP-1 and the requirements of Section 210 of the Specifications or as designated by the Engineer

B. **RAP:** Recycled asphalt pavement material will not be permitted.

C. **Coarse aggregate** shall conform to the requirements of Section 203 of the Specifications or as directed by the Engineer. In addition the following requirements shall be met:

Flat and Elongated Particles when tested according to ASTM D 4791 the amount retained on and above the No. 4 sieve shall conform to the following:

3 to 1	Not greater than 25 percent.
5 to 1	Not greater than 10 percent.

Water Absorption when tested according to AASHTO T85 shall be no greater than 2 percent.

D. **Fine aggregate** shall conform to the requirements of Section 202 of the Specifications, except for grading, which shall be tested according to AASHTO TP 33 (Method A) with a value of not less than 45 percent and a sand equivalent value of not less than 50 (AASHTO T 176).

E. **Mineral Filler** shall conform to the requirements of Section 201 of the Specifications.

F. **Fiber Additive** when required shall be cellulose or mineral fiber approved by the Engineer based on supplier's certification of properties and documentation of success in similar applications in hot mix asphalt.

G. **Anti-stripping Additive** shall be hydrated lime at a rate of 1 percent of the total mix or a chemical anti-stripping agent, which has a proven performance in a hot mix asphalt using the same aggregate sources as approved by the Engineer.

III. MIX FORMULA

The Contractor shall submit for the Engineer's approval, a job mix formula within the following design ranges of percent passing each sieve size as noted:

Sieve Size	Percent By Weight Passing Square Mesh Sieves (in)	Production Tolerance (Single Test)
1/2"	100	-2
3/8"	85-100	+/- 5
#4	25-40	+/- 4
#8	19-32	+/- 4
#16	15-23	+/- 3
#30	10-18	+/- 3
#50	8-13	+/- 3
#100	6-10	+/- 2
#200	4-7	+/- 1

Asphalt Content, %	Production Tolerance (Single Test)
5.0 – 5.5*	+/-0.2

*Target asphalt content shall result in a minimum film thickness of 9 microns.

In addition to the job mix submittal, the Contractor shall submit ignition furnace calibration data in accordance with VTM-102 and aggregate property test results prepared by an approved testing laboratory for the aggregate components or aggregate blend.

Job mixes outside the above design range will be considered by the Engineer based on mix performance documented by the supplier to eliminate or minimize flushing or visual deficiencies and may include changes to gradation, asphalt content and/or the use of fibers. The Engineer may require limited production of less than 300 tons for verification of an acceptable mix, prior to the Engineer's approval of the job mix.

IV. SURFACE PREPARATION

Prior to the commencement of paving operations, the existing pavement surface shall be cleaned of all accumulated dust, mud, vegetation or other debris, which may affect the bond of the thin lift hot mix asphalt overlay by the Contractor.

Pavement cracks or joints ¼ inch or more in width shall be cleaned and filled with a sealant material conforming to the Special Provision For Sealing Cracks in Asphalt Concrete Pavements or Hydraulic Cement Concrete Pavement. Pavement markers, thermoplastic pavement marking and tape pavement markings shall be removed prior to the commencement of paving operations. Pavement irregularities greater than 1 inch in depth shall be filled with a material approved by the Engineer.

Utility structures shall be protected and referenced prior to paving for location and adjustment (when necessary) after paving at no cost to the Department.

V. TACK COAT

A tack coat of asphalt emulsion meeting the requirements specified herein or other emulsion approved by the Engineer shall be applied prior to placement of the asphalt concrete. The tack coat shall be placed within 3 seconds of placement of asphalt concrete except as otherwise stated hereinafter or directed by the Engineer. At no time should any part of the paving machine come into contact with the tack coat before the asphalt concrete wearing course is applied. The emulsion shall be uniformly applied with a paver spray bar conforming to the requirements of Section 314.04(b) of the Specifications, except when using hand spray equipment for tacking areas inaccessible to the paver spray bar as directed by the Engineer. When using hand spray equipment, placement of the tack coat shall be done prior to paving. The emulsion asphalt shall be applied at a temperature

recommended by the supplier at a rate of 0.20 to 0.30 gallons per square yard unless otherwise approved by the Engineer. Emulsion asphalt shall conform to the following

Test on Emulsion	Method	Min	Max
Viscosity at 77° F, SSF	ASTM D88	20	100
Sieve Test, %	ASTM D244	—	0.05
24 hour storage stability, % (Note 1)	ASTM D244	—	1
Residue from distillation at 400° F, % (Note 2)	ASTM D244	63	
Oil portion from distillation ml of oil per 100g emulsion			2
Demulsibility, % 35 ml 0.02 N CaCl2 or 35 ml 0.8% dioctyl sodium sulfosuccinate	ASTM D244	60	
Test on Residue From Distillation		Min	Max
Solubility in TCE, % (Note 3)	ASTM D2042	97.5	
Elastic Recovery, % (Note 4)	ASTM D6084	58	—
Penetration @ 77° F, 100 g, 5 sec. dmm.	ASTM D5	60	150

Note 1: After standing undisturbed for 24 hours, the surface shall show no white, milky colored substance, but shall be a smooth homogeneous color throughout.

Note 2: ASTM D244 with modifications to include a 400° F +/- 10° F maximum temperature to be held for a period of 15 minutes.

Note 3: ASTM D 2042, Test Method for Solubility of Polymer-Modified Asphalt Materials in Trichloroethylene

Note 4: With exception that the elongation is 20 cm and the test temperature is 50° F.

VI. PLACEMENT OF HOT MIX ASPHALT

The application rates of the overlay shall range from 80 lbs/sy to 85 lbs/sy in order to result in a ¾" compacted lift thickness.

The thin lift of hot mix asphalt shall be placed by a paver designed for the placement of thin lifts as designated in the contract. The hot mix asphalt shall be delivered to the paver hopper at a temperature of 315°F +/- 15°F measured in the paver hopper. The paver shall be capable of placing the hot mix asphalt at a speed of 30 feet per minute. When the base temperature is 50°F or above, placement of the asphalt concrete wearing course shall be permitted.

VII. COMPACTION

Two steel double drum rollers weighing no less than 10 tons shall perform compaction of the hot mix asphalt. No less than two passes shall be completed before the surface temperature of the asphalt has reached 185°F.

VIII. ACCEPTANCE

The Contractor shall perform a gradation, and asphalt cement content on one sample taken in a random manner approved by the Engineer from each 500 tons of production. The material will be considered acceptable for gradation and asphalt content, if the results obtained are within the tolerance allowed from the job mix formula in the above table. Material represented by test results outside the tolerance may be removed and replaced with acceptable material by the Contractor at no additional cost to the Department at the discretion of the Engineer.

Should visual examination by the Engineer reveal that the material in any load, or portion of the paved roadway is contaminated, segregated, or flushed with asphalt cement, that load, or portion of the paved roadway may be rejected without additional sampling of the material.

IX. WARRANTY

The Contractor shall provide a one-year warranty from the date of final acceptance on all thin hot mix asphalt concrete overlay surfaces. The Department will periodically monitor the overlay surface installed throughout the warranty period for compliance and acceptability. The Contractor shall repair any area that fails before the end of the warranty period and shall do so within 14 days after Department notification unless otherwise directed by the Department. Failure of the thin hot mix asphalt concrete overlay surface is defined as the loss of adhesion of the material to the underlying layer resulting in a pothole greater than 1 square foot of area (delamination). The Engineer shall notify the Contractor of the date for the warranty inspection at the end of the warranty period and the Contractor shall be present at the inspection.

X. MEASUREMENT AND PAYMENT

Thin hot mix asphalt concrete will be measured in tons and paid for at the contract unit price per ton, which shall include tack coat, surface preparation (except crack and joint sealing), all materials, additives, labor and equipment as described herein to install and complete the work. Crack and joint sealing will be paid in accordance with Special Provision for **Sealing Cracks in Asphalt Concrete Pavements or Hydraulic Cement Concrete Pavement (Prior to Overlay)**.

Payment will be made under:

Pay Item	**Pay Unit**
Thin Hot Mix Asphalt Concrete	Ton

——STANDARD 200 SERIES SSs (SUPPLEMENTAL SPECIFICATIONS)——

GUIDELINES — FOR PROJECTS REQUIRING SUPERPAVE ASPHALT CONCRETE. WHEN THIS PROVISION APPLIES INCLUDE THE FOLLOWING IN THE PROPOSAL: SS31504 SuperPave -Asphalt Conc Pave.

SS21103-1209 December 3, 2009

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 211—ASPHALT CONCRETE

SECTION 211—ASPHALT CONCRETE of the Specifications is amended as follows:

Section 211.01—Description is replaced with the following:

Asphalt concrete shall consist of a combination of mineral aggregate and asphalt material mixed mechanically in a plant specifically designed for such purpose.

An equivalent single-axle load (ESAL) will be established by the Engineer, and SUPERPAVE mix types may be specified as one of the types listed as follows:

Mix Type	Equivalent Single-Axle Load (ESAL) Range (millions)	Minimum Asphalt PerformanceGrade (PG)[2]	Aggregate Nominal Maximum Size[1]
SM-9.0A	0 to 3	64-16	3/8 in
SM-9.0D	3 to 10	70-16	3/8 in
SM-9.0E	Above 10	76-22	3/8 in
SM-9.5A	0 to 3	64-16	3/8 in
SM-9.5D	3 to 10	70-16	3/8 in
SM-9.5E	Above 10	76-22	3/8 in
SM-12.5A	0 to 3	64-16	1/2 in
SM-12.5D	3 to 10	70-16	1/2 in
SM-12.5E	Above 10	76-22	1/2 in
IM-19.0A	Less than 10	64-16	3/4 in
IM-19.0D	10 to 20	70-16	3/4 in
IM-19.0E	20 and above	76-22	3/4 in
BM-25.0A	All ranges	64-16	1 in
BM-25.0D	Above 10	70-16	1 in

[1]**Nominal Maximum Size** is defined as one sieve size larger than the first sieve to retain more than 10 percent aggregate.

[2]**Minimum Asphalt Performance Grade (PG)** is defined as the minimum binder performance grade for the job mixes as determined by AASHTO T170 or AASHTO M320.

Asphalt concrete shall conform to the requirements for the mix type designated.

At the Contractor's option, Warm Mix Asphalt (WMA) additive or process may be used in lieu of the appropriate Hot Mix Asphalt (HMA).

Section 211.02(h) **antistripping additive** is amended by adding the following to the second paragraph:

When a Warm Mix Asphalt (WMA) additive or process, as described in 211.02(i) of the Specifications, is used in lieu of Hot Mix Asphalt (HMA) in the production of asphalt concrete, the minimum TSR requirement shall be 0.80 for the design and production tests.

Section 211.02—Materials is amended by adding the following:

(k) **Warm Mix Asphalt (WMA)** additives or processes shall be approved by the Department prior to use. Approved materials and processes shall be obtained from the Department's approved list which is included in the Materials Division's Manual of Instructions.

Section 211.03—Job-Mix Formula is amended to replace the first and second paragraph of (f) with the following:

(f) A determination will be made that any asphalt concrete mixture being produced conforms to the job-mix formula approved by the Department. The Department and Contractor will test the mixture using samples removed from production. The following tests will be conducted to determine the properties listed:

Property	Test
Asphalt content	VTM-102, (VTM-36 when approved)
Gradation	AASHTO T-30
SUPERPAVE properties	AASHTO R35
Asphalt cement material	AASHTO T316 or T-201

For Warm Mix Asphalt (WMA), SUPERPAVE properties will be determined by the Department and Contractor once the WMA has been allowed to cool to 100 degrees F or less and reheated based on the mix designation in Section 211.03(d)6 of the Specifications.

The Department will perform rut testing in accordance with the procedures detailed in VTM-110. If the results of the rut testing do not conform to the following requirements, the Engineer reserves the right to require adjustments to the job-mix formula:

Mix Designation	Maximum Rut Depth, mm
A	7.0
D	5.5
E, (S)	3.5

After calibration of the gyratory compactor is completed, adjustments to the job-mix formula may be required by the Engineer.

TABLE II-12A AGGREGATE PROPERTIES is amended to add **Mix Type IM-19.0E** as follows:

TABLE II-12A
Aggregate Properties

	Coarse Aggregate Properties				
	CAA		ASTM D4791		
Mix Type	1 fractured face	2 fractured faces	F & E "(5:1) % by weight	Fine Aggregate Properties SE	FAA
IM-19.0 E	95% min.	90% min.	10% max.[1]	45% min.	45% min.

TABLE II-13 ASPHALT CONCRETE MIXTURES: DESIGN RANGE is amended to add **Mix Type IM-19.0E** to IM-19.0 A,D as follows:

TABLE II-13
Asphalt Concrete Mixtures: Design Range[1]

Mix Type	Percentage by Weight Passing Square Mesh Sieves										
	2 in	1 1/2 in	1 in	3/4 in	1/2 in	3/8 in	No. 4	No. 8	No. 30	No. 50	No. 200
IM-19.0 A,D,**E**			100	90-100	90 max.	--	--	28-49			2-8

TABLE II-14 MIX DESIGN CRITERIA is replaced with the following:

TABLE II-14
Mix Design Criteria

Mix Type	VTM (%) Production (Note 1)	VFA (%) Design	VFA (%) Production (Note 2)	Min. VMA (%)	Fines/Asphalt Ratio (Note 3)	No. of Gyrations N Design	No. of Gyrations N Initial	No. of Gyrations N Max	Density (%) at N Initial
SM-9.0A Notes 1,2,3	2.0-5.0	75-80	70-85	16	0.6-1.3	65	7	100	≤ 90.5
SM-9.0D Notes 1,2,3	2.0-5.0	75-80	70-85	16	0.6-1.3	65	7	100	≤ 89.0
SM-9.0E Notes 1,2,3	2.0-5.0	75-80	70-85	16	0.6-1.3	65	7	100	≤ 89.0
SM-9.5A Notes 1,2,3	2.0-5.0	73-79	68-84	15	0.6-1.2	65	7	100	≤ 90.5
SM-9.5D Notes 1,2,3	2.0-5.0	73-79	68-84	15	0.6-1.2	65	7	100	≤ 89.0
SM-9.5E Notes 1,2,3	2.0-5.0	73-79	68-84	15	0.6-1.2	65	7	100	≤ 89.0
SM-12.5A Notes 1,2,3	2.0-5.0	70-78	65-83	14	0.6-1.2	65	7	100	≤ 90.5
SM-12.5D Notes 1,2,3	2.0-5.0	70-78	65-83	14	0.6-1.2	65	7	100	≤ 89.0
SM-12.5E Notes 1,2,3	2.0-5.0	70-78	65-83	14	0.6-1.2	65	7	100	≤ 89.0
IM-19.0A Notes 1,2,3	2.0-5.0	69-76	64-81	13	0.6-1.2	65	7	100	≤ 90.5
IM-19.0D Notes 1,2,3	2.0-5.0	69-76	64-81	13	0.6-1.2	65	7	100	≤ 89.0
IM-19.0E Notes 1,2,3	2.0-5.0	69-76	64-81	13	0.6-1.2	65	7	100	≤ 89.0
BM-25.0A Notes 2,3,4	1.0-4.0	67-87	67-92	12	0.6-1.3	65	7	100	≤ 89.0
BM-25.0D Notes 2,3,4	1.0-4.0	67-87	67-92	12	0.6-1.3	65	7	100	≤ 89.0

[1]SM = Surface Mixture; IM = Intermediate Mixture; BM = Base Mixture.
Note 1: Asphalt content should be selected at 4.0 % Air Voids,
Note 2: During production of an approved job mix, the VFA shall be controlled within these limits.
Note 3: Fines-asphalt ratio is based on effective asphalt content.
Note 4: Base mix shall be designed at 2.5% air voids. BM-25.0 A shall have a minimum asphalt content of 4.4% unless otherwise approved by the Engineer. BM-25.0D shall have a minimum asphalt content of 4.6% unless otherwise approved by the Engineer.

TABLE II-14A RECOMMENDED PERFORMANCE GRADE OF ASPHALT is replaced with the following:

TABLE II-14A
Recommended Performance Grade of Asphalt Cement

	Percentage of Reclaimed Asphalt Pavement (RAP) in Mix

Mix Type	%RAP ≤ 20.0%	20.0% < %RAP ≤ 30%	20.0% < %RAP ≤ 35%
SM-9.0A, SM-9.5A, SM-12.5A	PG 64-22	PG 64-22	
SM-9.0D, SM-9.5D, SM-12.5D	PG 70-22	PG 64-22	
IM-19.0A	PG 64-22	PG 64-22	
IM-19.0D	PG 70-22	PG 64-22	
BM-25.0A	PG 64-22		PG 64-22
BM-25.0D	PG 70-22		PG 64-22

Section 211.04—Asphalt Concrete Mixtures is amended by replacing (b) with the following:

(b) **Types IM-19.0A, IM-19.0D, and IM-19.0E asphalt concrete** shall consist of crushed stone, crushed slag, or crushed gravel and fine aggregate, slag or stone screenings, or a combination thereof combined with asphalt cement.

NOTE: At the discretion of the Engineer, an intermediate mix may be designated as either SM-19.0A or SM-19.0D. When designated as such, no more than 5 percent of the aggregate retained on the No. 4 sieve may be polish susceptible. All material passing the No. 4 sieve may be polish susceptible.

Section 211.04—Asphalt Concrete Mixtures is amended to replace (e) with the following:

(e) **Type SM-9.5, SM-12.5, IM-19.0 and BM-25.0 asphalt concrete** may be designated E (polymer modified), or stabilized (S). Asphalt concrete mixtures with the E designation may not be stabilized.

1. **Type E asphalt mixtures** shall consist of mixes incorporating a neat asphalt material with polymer modification complying with the requirements of PG 76-22 and have a rolling thin film oven test residue elastic recovery at 77 degrees F of a minimum of 70 percent when tested in accordance with ASTM D 6084 procedure A. E designated mixtures shall not contain more than 15 percent reclaimed asphalt pavement (RAP) material.

2. **Type (S) asphalt mixtures** shall consist of mixes incorporating a stabilizing additive from the Department's approved list found in the Materials Division's Manual of Instructions. These mixes shall be designated with an (S) following the standard mix designation. The minimum required additive shall be as specified on the Department's approved list found in the Materials Division's Manual of Instructions.

3. **Type L asphalt mixtures** will be allowed to contain a 100 percent polishing coarse and fine aggregate. These mixes shall be designated with a L following the standard mix designation.

Section 211.06—Tests is amended to replace the second and third paragraphs with the following:

Abson recovery samples shall be PG graded according to the requirements of AASHTO M 320-05. Samples meeting the required grades specified in Section 211.01 of the Specifications shall be acceptable.

Section 211.15—Initial Production is amended to replace the first sentence with the following:

(a) **Warm Mix Asphalt (WMA):** At the start of production, the Contractor shall place no more than 500 tons or up to one day's production as directed by the Engineer at an

approved site, which may be the project site, so the Engineer can examine the process control of the mixing plant, the Contractor's placement procedures, surface appearance of the mix, compaction patterns of the Contractor's roller(s), and correlation of the nuclear density device.

(b) **Hot Mix Asphalt (HMA):** At the start of production of a mix not previously used on a state roadway, the Contractor shall place 100 to 300 tons or up to one day's production as directed by the Engineer at an approved site, which may be the project site, so the Engineer can examine the process control of the mixing plant, the Contractor's placement procedures, surface appearance of the mix, compaction patterns of the Contractor's roller(s), and correlation of the nuclear density device. The material shall be placed at the specified application rate and will be paid for at the contract unit price for the specified mix type. The Engineer will determine the disposition of material that was not successfully produced and/or placed due to negligence in planning, production, or placement by the Contractor.

GUIDELINES — FOR PROJECTS REQUIRING JOINT MATERIALS.

SS21201-0908 January 17, 2008

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 212—JOINT MATERIALS

SECTION 212—JOINT MATERIALS of the Specifications is amended as follows:

Section 212.02(h)—Gaskets for pipe is amended by deleting the third paragraph.

GUIDELINES — FOR PROJECTS REQUIRING HYDRAULIC CEMENT. WHEN THIS PROVISION APPLIES INCLUDE THE FOLLOWING IN THE PROPOSAL: SS21501 Hydraul Cement Conc Admixtures.

SS21402-0908 January 28, 2008

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 214—HYDRAULIC CEMENT

SECTION 214—HYDRAULIC CEMENT of the Specifications is amended as follows:

Section 214.02(b) **Portland cements** is amended by replacing 1. with the following:

1. The SO_3 content as specified in AASHTO M85 will be permitted, provided supporting data specified in AASHTO M85 are submitted to the Department for review and acceptance prior to use of the material.

Section 214.02(b) **Portland cements** is amended by deleting 3., 4., and 5.

Section 214.02—Detail Requirements is amended by adding the following:

(c) **Expansive hydraulic cement** shall conform to the requirements of ASTM C 845 Type K.

GUIDELINES — FOR PROJECTS REQUIRING HYDRAULIC CEMENT CONCRETE ADMIXTURES.

SS21501-0908 January 28, 2008

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 215—HYDRAULIC CEMENT CONCRETE ADMIXTURES

SECTION 215—HYDRAULIC CEMENT CONCRETE ADMIXTURES of the Specifications is amended as follows:

Section 215.02(g) **Fly ash** is replaced with the following:

(g) **Pozzolan** shall conform to Section 241 of the Specifications.

Section 215.02—Materials is amended by adding the following:

(k) **Metakaolin** shall conform to the requirements of AASHTO M321

GUIDELINES — FOR PROJECTS REQUIRING HYDRAULIC CEMENT CONCRETE. LOW PERMEABILITY CONCRETE IS NOW INCLUDED IN THIS SP. WHEN THIS PROVISION APPLIES INCLUDE THE FOLLOWING IN THE PROPOSAL: SS21402 Hydraulic Cement and SS21501 Hydraul Cement Conc Admixtures.

SS21702-1209 December 4, 2009c

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 217—HYDRAULIC CEMENT CONCRETE

SECTION 217—HYDRAULIC CEMENT CONCRETE of the Specifications is amended as follows:

Section 217.02(a) **Cementitious Materials** is replaced with the following:

Cementitious materials shall be a blend of mineral admixtures and Portland cement or a blended cement. In overlay concretes, expansive hydraulic cement is permitted in lieu of Portland cement. Portland cement (Types I, II, III) blended cements (Type IP, Type IS) or expansive cement (Type K) shall comply with Section 214 of the Specifications. Flyash, ground granulated iron blast-furnace slag (GGBFS), silica fume or metakaolin shall conform to Section 215 of the Specifications. As a portion of the cementitious material, Table 1 lists the minimum percents of specific pozzolans required by mass of the cementitious material depending on the alkali content of the cement. Any other mineral admixture or any other amount or combination of mineral admixtures may be used if approved by the Engineer. As a portion of the cementitious material, the fly ash content shall not exceed 30 percent for Class F, the ground granulated blast-furnace slag content shall not exceed 50 percent and the silica fume content shall not exceed 10 percent unless approved by the Engineer. Class C Flyash or other pozzolans may be used provided the contractor demonstrates that the percent usage of Class C Flyash or other pozzolans have a maximum expansion of 0.15% according to ASTM C227 at 56 days using borosilicate glass as aggregate. Blended cements require no further pozzolan additions to meet minimum pozzolan content to compensate for the alkali-silica reaction.

Up to 7 percent silica fume may be added to all combinations of cementitious materials to reduce early permeability without approval by the Engineer. Other silica fume additions must be approved by the Engineer.

Table 1 – Minimum percent pozzolan required by mass of cementitious material as a portion of the total cementious materials and are based upon the alkali content of the cement.

	Total Alkalies of Cement is less than or equal to 0.75%	Total Alkalies of Cement is greater than 0.75% and less than or equal to 1.0%
Class F Flyash	20%	25%
GGBF Slag	40%	50%
Silica Fume	7%	10%
Metakaolin	7%	10%

TABLE II–17 Requirements for Hydraulic Cement Concrete is replaced with the following:

TABLE II-17
Requirements for Hydraulic Cement Concrete

Class of Concrete	Design Min. Laboratory Compressive Strength at 28 Days (f'c) (psi)	Aggregate Size No.[6]	Design Max. Laboratory Permeability at 28 Days (Coulombs)[5]	Design Max. Laboratory Permeability at 28 days - Over tidal water (Coulombs)[5]	Nominal Max. Aggregate Size (in)	Min. Grade Aggregate	Min. Cementitious Content (lb./cu yd)	Max. Water /Cementitious Mat. (lb. Water/lb. Cement)	Consistency (in of slump)	Air Content (percent)[1]
A5 Prestressed and other special designs[2]	5,000 or as specified on the plans	57 or 68	1,500	1,500	1	A	635	0.40	0-4	4 1/2 ± 1 1/2
A4 General	4,000	56 or 57	2,500	2,000	1	A	635	0.45	2-4	61/2 ± 1 1/2
A4 Post & rails	4,000	7,8 or 78	2,500	2,000	0.5	A	635	0.45	2-5	7± 2
A3 General	3,000	56 or 57	3,500	2,000	1	A	588	0.49	1-5	6± 2
A3a Paving	3,000	56 or 57	3,500	3,500	1	A	564	0.49	0-3	6± 2
A3b Paving	3,000	357	3,500	3,500	2	A	N.A	0.49	0-3	6± 2
B2 Massive or lightly Reinforced	2,200	57	N.A.	N.A.	1	B	494	0.58	0-4	4± 2
C1 Massive Unreinforced	1,500	57	N.A.	N.A.	1	B	423	0.71	0-3	4± 2
T3 Tremie seal	3,000	56 or 57	N.A.	N.A.	1	A	635	0.49	3-6	4± 2
Latex hydraulic cement concrete overlay[3]	3,500	7,8 or 78	1,500	1,500	0.5	A	658	0.40	4-6	5± 2
Silica fume, silica fume /Class F Fly Ash or silica fume/slag concrete overlay[4]	5000	7,8 or 78	1,500	1,500	0.5	A	658	0.40	4-7	6± 2
Class F Fly Ash or slag overlay	4000	7,8 or 78	1,500	1,500	0.5	A	658	0.40	4-7	6± 2

(See next page for notes on TABLE II-17).

(See next page for notes on TABLE II-17).

---------- (TABLE II-17 Notes) ----------

[1] When a high-range water reducer is used, the upper limit for entrained air may be increased by 1% and the slump shall not exceed 7 inches.

[2] When Class A5 concrete is used as the finishing bridge deck riding surface, or when it is to be covered with asphalt concrete with or without waterproofing, the air content shall be 5 1/2 ± 1 1/2 percent.

[3] The latex modifier content shall be 3.5 gallons per bag of cement. Slump shall be measured approximately 4.5 minutes after discharge from the mixer.

[4] Silica fume with a minimum of 7% by weight of cementitious material; silica fume with a range of 2.5-5 % shall be combined with Class F Fly Ash in range of 15-20% and minimum cement of 77.5% by weight of cementitious material; silica fume with a range of 2.5-5% shall be combined with Ground Granulated Blast Furnace Slag in the range of 30-35% and a minimum cement of 67.5% by weight of cementitious material.

[5] The permeability testing does not apply to small bridges identified on the bridge plans and to concrete structures and incidental concrete as described in Sections 219, 232, 302, 415, 502, 504, 506 and 519. Curing and testing of test cylinders for permeability will be in accordance with VTM 112.

[6] The contractor may use different aggregate sizes or a combination of sizes to increase the coarse aggregate content of the concrete as approved by the Engineer. The maximum size of the coarse aggregate shall not exceed 2.5 inches.

Note: With the approval of the Engineer, the Contractor may substitute a higher class of concrete for that specified at the Contractor's expense.

Section 217.02(b) **Formulated latex modifier** is amended by adding the following:

For latex-modified concrete, Type I, Type II, Type III or Type K, cement shall be used without mineral admixtures.

Section 217.04(a)4. **Admixtures** is replaced with the following:

4. **Admixtures** shall be dispensed and used according to the manufacturer's recommendations. They shall be added within a limit of accuracy of 3 percent, by means of an approved, graduated, transparent, measuring device before they are introduced into the mixer. If more than one admixture is to be used, they shall be released in sequence rather than in the same instant. Once established, the sequence of dispensing admixtures shall not be altered. However, when the amount of admixture required to give the specified results deviates appreciably from the manufacturer's recommended dosage, use of the material shall be discontinued.

Section 217.05(a) **Batching Equipment** is amended to replace the second paragraph with the following:

Scales used for weighing aggregates and cement shall be approved and sealed in accordance with the requirements of Section 109 of the Specifications.

Section 217.07—Proportioning Concrete Mixtures is amended to replace the first paragraph with the following:

The Contractor is responsible for having a Certified Concrete Plant Technician available during batching operations, and a Certified Concrete Field Technician shall be present during placing operations.

Section 217.07—Proportioning Concrete Mixtures is amended to delete the third paragraph beginning with **A Certified Concrete Batcher**.

Section 217.08(a) **Air Consistency Tests** is amended to replace the first paragraph with the following:

Air Consistency Tests: Air and consistency tests will be performed by the Department prior to discharge of concrete into the forms to ensure that specification requirements are consistently being complied with for each class of concrete. The sample secured for the tests shall be taken after at least two cubic feet of concrete has been discharged from the delivery vehicle. The two cubic feet discharged is not to be used as part of the test sample. Any deviation from sampling and testing procedures must be approved by the Engineer. The Contractor shall provide a receptacle conforming to the requirements of ASTM C31, Section 5.9, for the Department's use in obtaining the sample. If either determination yields a result that is outside of the allowable range for air content or consistence, the following procedure will be used:

1. The Engineer will immediately perform a recheck determination. If the results confirm the original test results, the load will be rejected.

2. The Contractor's representative will be immediately informed of the test results.

3. The Contractor's representative shall notify the producer of the test results through a pre-established means of communication.

Section 217.08(b) **Strength Test** is amended to replace the first and second paragraphs with the following:

Strength Tests: The 28-day strengths specified in Table II-17 are strengths used in the design calculations. The Engineer will verify design strengths by tests made during the progress of the work in accordance with the requirements of ASTM C39 and C31 with the exception that the fresh concrete sample used for testing is secured after at least two cubic feet has been discharged from the delivery vehicle. The two cubic feet discharged is not to be used as part of the test sample. Any deviation from sampling and testing procedures must be approved by the Engineer. If the test results do not conform to the strengths specified in Table II-17, immediate steps shall be take to adjust the design mixture and an investigation will be initiated by the Engineer to determine the acceptability of the concrete. Use of ASTM C42 will be at the Engineer's discretion.

The Contractor shall provide a storage chamber at his expense for temporary storage of the Department's concrete cylinders before concrete is placed. The contractor shall be responsible for the chamber maintaining the concrete test cylinders in a continuously moist condition within a temperature range of 60 degrees F to 80 degrees F and shall be equipped with a continuously recording thermometer accurate to ± 2 degrees F for the duration of concrete field cylinder curing period. The chamber shall be located in an area where the test cylinders will not be subject to vibration and shall be of sufficient size or number to store, without crowding or wedging, the required number of test cylinders as determined by the Contractor based on his plan of operations. The Chamber and location of the chamber must be approved by the Engineer.

Section 217.08—Acceptance is amended by adding the following:

(c) **Concrete Temperature** shall be measured in accordance with the requirements of ASTM C1064.

(d) **Quality Assurance** for Low Permeability Concrete**:**

General:

At least two trial batches, using job materials, with permissible combination of cementitious materials shall be prepared, and test specimens shall be cast by the Contractor and tested by the Department for permeability and strength at least a month before the field application. The permeability samples shall be cylindrical specimens with a 4-inch diameter and at least 4-inches in length. Cylinders will be tested at 28 days in accordance with VTM 112. The test value shall be the result of the average values of tests on two specimens from each batch. Permeability values obtained from trial batches shall be 500 coulombs below the maximum values specified in Table II-17 of the Specifications to be acceptable.

Acceptance Tests:

For each set of cylinders made for compressive strength tests, two additional cylinders shall be made for the permeability test. The Department will be responsible for making and testing all permeability test specimens.

If the average permeability test result is equal to or less than the value for the specified class of concrete in Table II-17, then full payment will be made for the lot the average permeability test result represents. However, if the average permeability test result exceeds the coulomb value in Table II-17, payment for that lot of concrete shall be reduced by 0.005 percent for each coulomb above the coulomb value in Table II-17 multiplied by the bid item cost of the concrete times the number of cubic yards or cubic meters of concrete in the lot. The reduction in price will not exceed 5 percent of the bid price of the concrete. Any concrete with a coulomb value that exceeds the maximum required in Table II-17 by 1000 coulomb will be rejected. However, bridge deck concrete with any coulomb value exceeding the maximum required by over 1000 coulomb may be accepted by the Engineer at 95 percent of the bid price if the concrete in question has the required strength and meets other specification requirements, and the Contractor applies, at his own expense, an approved epoxy concrete overlay to the top of the entire deck. In such case deck grooving will not be required. Epoxy overlays over latex overlays will not be permitted. The adjustment to the roadway grade shall be made as required by the Engineer at the Contractor's expense.

Similarly, concrete in abutments and pier caps with coulomb value exceeding the maximum required in Table II-17, by more than 1000 coulomb may be accepted at 95 percent of the bid price if it has the required strength and meets other specification requirements, and the Contractor applies at his own expense, one coat of Type EP-3B and one coat of EP-3T in conformance with the requirements of Section 243.02 of the Specifications, on top of the pier cap or abutment seat.

Section 217.09(b) **Ready Mixed Concrete** is amended to replace the second paragraph with the following:

Each load of transit or shrink-mixed concrete shall be accompanied by Form TL-28 signed by the VDOT Certified Concrete Field Technician or a designated company representative working under the direction of the VDOT Certified Concrete Field Technician. The form shall be delivered to the Inspector at the site of the work. Loads that do not carry such information or that do not arrive in satisfactory condition shall not be used.

Section 217.09(b) **Ready-Mixed Concrete** is amended to replace the fourth paragraph and the table with the following:

Each batch of concrete shall be delivered to the site of work and discharged within 90 minutes of the time the cement is introduced into the mixture unless approved otherwise by the Engineer.

Section 217.09(b)1. **Transit mixing** is amended to replace the first paragraph with the following:

1. **Transit mixing:** Concrete shall be mixed in a truck mixer. Mixing shall begin immediately after all ingredients are in the mixer and shall continue for at least 70 revolutions of the drum or blades at the rate of at least 14 but no more than 20 revolutions per minute.

GUIDELINES — FOR PROJECTS REQUIRING ITEMS CAST FROM METAL TO A SPECIFIC DESIGN IN A MANUFACTURING PLANT.

SS22401-0908 November 15, 2007

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 224—CASTINGS

SECTION 224—CASTINGS of the Specifications is amended as follows:

Section 224.02—Materials is amended as follows:

The following is added as the first paragraph:

All casting suppliers/manufacturers shall have an approved QA/QC plan on file with the Department. Junction boxes that are to be installed within that portion of the roadway not protected by a guardrail or barrier shall be designed in accordance with the requirements of AASHTO M306 and M105, Class 35B.

Section 224.02(b) is replaced with the following:

(b) **Gray iron castings** used in that portion of the roadway not protected by a guardrail or barrier shall conform to the requirements of AASHTO M306 and M105, Class 35B. All other castings shall conform to AASHTO M105, Class 35B.

Section 224.02(c) is replaced with the following:

(c) **Ductile iron castings** used in that portion of the roadway not protected by a guardrail or barrier shall conform to AASHTO M306. All other ductile iron castings shall conform to ASTM A536, Grade 60-40-18.

Section 224.03—Detail Requirements is replaced with the following:

If castings are supplied from materials conforming to sections 224.02 (a), (d) and (e), all tolerances and workmanship requirements for castings shall conform to AASHTO M306. If used in that portion of the roadway not protected by a guardrail or barrier, the load testing shall conform to the requirements of AASHTO M306. When the alternate load test is used, test bars shall be present and fully identifiable with regard to the casting lot. Each casting in a lot must have the same markings as all of the other castings in the lot; if not, each group of castings with the same markings within the original lot, becomes a new lot.

GUIDELINES — FOR PROJECTS REQUIRING STRUCTURAL STEEL.

SS22601-0609 December 16, 2008

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 226—STRUCTURAL STEEL

SECTION 226—STRUCTURAL STEEL of the Specifications is amended as follows:

Section 226.02(b) **Other Structural Steel** is replaced with the following:

(b) **Other Structural Steel:** Unless otherwise specified, steel for other structural members except H-piles shall conform to the requirements of ASTM A36. H-piles shall conform to the requirements of ASTM A572 or ASTM A992. One copy of the mill analysis shall accompany steel piles shipped to the project site. Three copies of the mill analysis for structural steel members shall be submitted to the Engineer.

GUIDELINES — FOR PROJECTS REQUIRING PIPE AND PIPE ARCHES.

SS23201-0710 August 4, 2009

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 232—PIPE AND PIPE ARCHES

SECTION 232—PIPE AND PIPE ARCHES of the Specifications is amended as follows:

Section 232.02 Detail Requirements of the specifications is amended to replace the first paragraph with the following:

Concrete, corrugated steel and polyethylene pipe shall only be supplied from manufacturers currently having an approved Quality Control Plan on file with the Department.

Section 232.02(a)1.b.(6) is replaced with the following:

(6) **Strength tests** shall be performed by the three-edge bearing method in accordance with the requirements of AASHTO T280 or by control cylinders tested in accordance with ASTM C31 and C39 or by the testing of cores in accordance with ASTM C42. Control cylinders for acceptance testing shall be cured under the same conditions as the concrete the cylinders represent. Hand cast pipe and end sections may be tested in accordance with the requirements of ASTM C31 and C39. Concrete pipe may be shipped after reaching 85 percent of design strength as determined by control cylinders or cores.

Section 232.02(a)1.b.(7) is replaced with the following:

(7) **Absorption tests** shall be performed in accordance with the requirements of AASHTO T280 on specimens of broken pipe or cores.

GUIDELINES — FOR PROJECTS REQUIRING ELECTRICAL AND SIGNAL COMPONENTS. WHEN THIS PROVISION APPLIES INCLUDE THE FOLLOWING IN THE PROPOSAL: SS22401 CASTINGS.

SS23802-0609 March 4, 2008

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 238—ELECTRICAL AND SIGNALS COMPONETS

SECTION 238 ELECTRICAL AND SIGNAL COMPONENTS of the Specifications is amended as follows:

Section 238.02(f) Electrical and Signal Junction Boxes is replaced with following:

(f) **Electrical and Signal Junction Boxes:**

Boxes, frames and covers shall be water resistant. Covers shall be secured with stainless steel bolts and fasteners. Covers shall be flush with surface of the junction box and not protrude above the top of the junction box flange.

Junction box bolt attachment holes shall be drilled through to prevent debris from collecting in the threaded bolt holes.

Junction boxes shall be tested and certified by an independent testing laboratory as meeting the requirements indicated herein for approval for use. Independent testing laboratory shall be approved by VDOT Materials Division prior to testing. The Contractor shall furnish the Engineer documentation of such test results.

Testing reports shall provide complete test results for the type of design testing indicated for the respective type of junction box.

Junction Boxes for deliberate traffic in the roadway applications:

- Concrete shall conform to the requirements of Section 217 and shall be designed to meet the provisions of AASHTO's *Standard Specifications for Highway Bridges for* HS20 loading. Concrete shall have a design minimum compressive strength of 4000 psi.

- Gray Iron frame and covers shall conform to the requirements of Section 224.

Junction Boxes for off roadway applications:

- Shall conform to the requirements of ANSI/SCTE 77 2007 and tier 15 loading. Boxes shall be open bottom.

- Shall be Polymer concrete with straight sides or Polymer concrete with flared or straight fiberglass sides.

- Other materials may be submitted for the sidewalls provided they conform to the requirements of ANSI/SCTE 77 2007 and tier 15 loading.

Junction Boxes frames and covers for bridge structures encasements shall be one of the following types:

1. Steel castings conforming to the requirements of Section 224, galvanized inside and out.

2. Welded sheet steel having a thickness of at least 3/16 inch or 7 gage, galvanized inside and out.

3. Polymer concrete with fiberglass sides or all polymer concrete.

Section 238.02(h)6.f. **Light Emitting Diode (LED) traffic signal head sections** is amended to replace the third paragraph with the following:

LED arrow traffic signal modules shall conform to the requirements of the *ITE Vehicle Traffic Control Signal Heads – Light Emitting Diode Vehicle Arrow Traffic* issued April 3, 2006 (inclusive of any ITE documents that amend, revise and/or supersede it).

And to replace the seventh paragraph with the following:

The LED's shall be mounted and soldered to a printed circuit board. Modules shall be provided with an external in-line fuse or internal fusing of the 120 VAC (+) input. The fuse shall be rated in accordance with the LED module manufacturer. The LED signal module shall utilize the same mounting hardware used to secure the incandescent lens and gasket assembly and shall only require a screwdriver or standard installation tool to complete the mounting.

GUIDELINES — PROJECTS REQUIRING STONE MATRIX ASPHALT CONCRETE MIXES. When this Section applies include the following in the Proposal: SS21103 SuperPave -Asphalt Concrete, SS31504 SuperPave -Asphalt Conc Pave, SS31702 SMA -Asphalt Concrete Pavement.

SS24803-1209 October 2, 2009

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 248—STONE MATRIX ASPHALT CONCRETE

SECTION 248—STONE MATRIX ASPHALT CONCRETE of the Specifications is amended as follows:

Section 248.02(a)**—Coarse Aggregate** is replaced with the following:

(a) **Coarse Aggregate:** Coarse aggregate shall conform to the following requirements when tested in accordance with the specified tests:

1. Los Angeles Abrasion	AASHTO T96	40% max.
a. Exception for Northern Va. District – Prince William County Only	AASHTO T96	30% max.
2. Flat and Elongated Particles: Measured on No. 4 retained,	VTM-121	
3 to 1		20% max.
5 to 1		5% max.
3. Magnesium Sulfate Soundness Loss, 5 cycles	AASHTO T104	15% max.
4. Particles retained on No. 4 sieve shall have at least	ASTM D5821	
1 fractured face		100% min.
2 fractured faces		90% min.
5. Absorption	AASHTO T 85	2% max.

Except for the determination of flat and elongated particles (Section 248.02(a)2 of the Specifications),the aggregate properties specified are for each stockpile of coarse aggregate material designated on the job mix form (Form No. TL-127). The material contained in each stockpile shall meet the minimum or maximum criteria specified.

For flat and elongated particles, these values are based on the mathematical blend of the coarse aggregate material designated on the job mix form (TL-127). During production, these values are based on the SMA material sampled during the acceptance process (QC testing).

The use of slag will not be permitted.

At the discretion of the Engineer, mixes containing Reclaimed Asphalt Pavement (RAP) may be tested by VDOT for aggregate breakdown during lab compaction in accordance with VTM-99. If the percent of the total mix passing the No. 4 sieve increases by more than 10 percent after being compacted to N_{design} then the RAP component shall be changed or the authorization to use the mix will be discontinued.

Section 248.02(b)**—Fine Aggregate** is replaced by the following:

(b) **Fine Aggregate:** Virgin fine aggregates shall consist of a blend of 100 percent crushed aggregate. If RAP is being used as a component in SMA then the portion of the final SMA blend passing the No. 8 sieve shall have a minimum Fine Aggregate Angularity value of 45 percent as determined in accordance with AASHTO T 304 (Method A). The

magnesium sulfate soundness loss in 5 cycles shall not exceed 20 percent. In addition, the liquid limit shall not exceed 25 as determined in accordance with AASHTO T89.

Section 248.02(f)**—RAP** is replaced with the following:

(f) **RAP:** Reclaimed Asphalt Pavement (RAP) material may be used as a component material of SMA mixtures in conformance with the following:

1. SMA surface and intermediate mixtures containing RAP shall use the PG grade of asphalt cement designated by the mix specified on the plans or in the proposal e.g. an SMA-12.5 (76-22).

2. The final asphalt mixture shall conform to the requirements for the type specified.

3. During the production process, RAP material shall not be allowed to contact open flame.

4. RAP material shall be handled, hauled and stored in a manner that will minimize contamination. Further, the material shall be stockpiled and used in such manner that variable asphalt contents and asphalt penetration values will not adversely affect the consistency of the mixture.

Section 248.03—Composition of SMA Mixture is amended by adding the following:

Allowable RAP Percentages:

TABLE I-C
Specified Performance Grade of Asphalt and Use of RAP

Mix Type & PG	Allowable RAP Percentage in Mix
SMA-9.5 (70-22), SMA-12.5 (70-22) & SMA-19.0(70-22)	0.0 to 20.0
SMA-9.5 (76-22), SMA-12.5 (76-22) & SMA-19.0 (76-22)	0.0 to 15.0

TABLE II-24 SMA DESIGN RANGE is amended to replace **Surface Mix Type SMA 12.5** as follows:

TABLE II-24
SMA DESIGN RANGE

Percentage by Weight Passing Square Mesh Sieves (in)

Type No. (See Note)	1	¾	1/2	3/8	No. 4	No. 8	No. 30	No. 200
Surface Mixes								
SMA 12.5	-	100	85-95	80 max	22-28	16-24	15-20	10-12